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The Role of Antibiotic Mouth Rinses in Oral Health Care

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Abstract:
The use of antibacterial mouth rinses is important to dental professionals and their patients. Listerine antiseptic was found to greatly decrease the anaerobic and aerobic bacteria associated with bacteremia, when used as a sub gingival irrigant prior to scaling. Furthermore pre-procedural rinsing with Chlorhexidine gluconate can greatly decrease the number of bacteria aerosolized during many dental procedures. Studies have shown that both listerine and chlorhexidine have anti-Candida properties and therefore helpful to patients who are immunosuppressed and subject to the infection candidiasis. Healing of the wounds and aiding in plaque control following periodontal surgery are further benefits of chlorhexidine. These antibacterials can be adjuncts to implant maintenance.

Keywords: Oral health, Chlorhexidine, Chlorine dioxide, Cetylpyridinium chloride, Zinc salts, Essential oils, Triclosan.

INTRODUCTION:

A number of biological niches are integrated into the human body, each of which is colonized by commensal organisms that, numerically speaking, overwhelm the eukaryotic cells, and that protect the organism from infection by pathogenic species. Their complexity has been characterized using new tools in metagenomics, developed within the Microbiome Project[1].The oral cavity is one of the most important biological niches, containing hundreds of different species of bacteria, viruses, protozoa, and mycetes; these can become pathogens in response to drastic changes in their microenvironment, which occur normally throughout human life, and are normal in microbial physiology[2].

Supragingival plaque is mainly composed of Gram-positive bacteria, comprising Streptococcus sanguinis, S. mutans, S. mitis, S. salivarius, and lactobacilli, whereas the sub gingival plaque primarily includes Gram-negative anaerobic bacteria, such as Aggregatibacter actinomycetemcomitans, Tannerella forsythia, Campylobacter spp., Capnocytophaga spp., Eikenella corrodens, Fusobacterium nucleatum, Porphyromonas gingivalis, Prevotella intermedia and oral spirochetes such as Treponema denticola. In both the supragingival and the sub gingival areas, the microbial communities on teeth and gingival tissues can accumulate high concentrations of bacterial metabolites in their microenvironment (e.g., fatty acid end-products, ammonia, hydrogen peroxide, oxidants and carbon dioxide), further influencing the growth of other bacterial species.

CETYLPYRIDINIUM CHLORIDE:

This antimicrobial agent[3] reduces volatile sulphur compounds[4] and has been included in several preparations such as mouth rinses, mouth spray and dentifrices, its stability is enhanced by papain. Cetylpyridinium cations were also used in an oral gel. The oral care preparations containing cetylpyridinium chloride are not limited to humans but can also be used in animals. Thus, this active ingredient becomes the most commonly used for bad breath overwhelming in various preparations.

CHLORHEXIDINE :

Chlorhexidine reduces offensive oral odour[5] by reducing volatile sulphur compounds[6] in the breath[7] and produces long-term reduction[8] because of its antimicrobial efficacy of which the commonly used preparations are mouth rinses. The concentration of chlorhexidine in mouth rinses is 0.12%, which is efficacious with no unpleasant taste and no staining effect on teeth[10,11].

CHLORINE DIOXIDE:

The stable free radical, chlorine dioxide, has been used in mouthwashes for the reduction of Volatile sulphur compounds and volatile organic compounds[12] as it is an oxidizing agent of cysteine and methionine, both precursors of volatile sulphur compounds[13] . In addition, chlorine dioxide has antimicrobial efficacy, thus prevents dental diseases and consequently reduces putrefaction. Mouth rinses containing 1.0% NaClO2 which generates ClO2 were found to be sufficient to reduce volatile sulphur compounds for at least 8 hours[14,15].Dentifrices containing this oral antimicrobial have also been formulated and include various preparations such as mouth spray and chewing gum. In addition, it was used together with zinc ions to limit offensive breath by complexing with sulphur. However, the adverse effects resulting from generated chlorite ions remain unclear[16] that doubted its safety.

ESSENTIAL OILS:

With bactericidal activity against dental pathogenic microorganisms which accumulate in oral malodour, essential oils have been included in mouthwashes[17], particularly mint oils which inhibit pathogens in the respiratory tract[18] ,essential oils also have beneficial organoleptic properties. Oral care preparations containing essential oils were found to be effective against oral malodour[19] with comparative activity to chlorhexidine[20].Essential oils of anise, fennel, basil and juniper berry in mouthwash, toothpaste and mouth spray preparations were used to neutralize garlic odour in breath[21]. A combination of the aroma compounds, thymol, eucalyptol, menthol and methyl salicylate from essential

oils were formulated at acidic pH (3.0–5.5) and afforded antiseptic and anti caries activities in dentifrices. In addition, spearmint, peppermint and eucalyptus oils were widely used for their therapeutic and psychological effects, tea tree oil was used to suppress oral malodour with methyl acetate and methyl lactate as antibacterial enhancers. Furthermore, bay, bergamot, caraway, cedar, cinnamon, citronella, clove, coriander, laurel, lavender, lemon, marjoram, mustard, orange, orris, parley, pimento, pine, rosemary, sage, sassafras, terpentine, thyme and witch hazel oils were used in several dosage forms to reduce oral malodour. Mouth rinses are the major preparations for bad breath treatment and most contain alcohol. However, it is possible for these alcohols to be metabolized into odorous compounds thus elevating malodour. Therefore, concentrations of ethyl alcohol in mouth rinses tend to be reduced.Aroma compounds in essential oils have also been used in innovative products as complex compounds of menthol and anethole with b-cyclodextrin in lipsticks for breath refreshing.

SODIUM BICARBONATE:

The use of baking soda, the common name for NaHCO3, in halitosis treatment was carried out either in combination with peroxide or triclosan and was found to be highly effective at high concentrations[22].

TRICLOSAN:

The antibacterial triclosan or 2,4,4¢-trichloro-2¢-hydroxydiphenylether[23] widely incorporated into oral care products particularly for halitosis treatment as it is highly compatible with other ingredients[24] and is stable[25] in various preparations. Triclosan at a concentration of 0.3% reduced volatile sulphur compounds[26] , and the calcium-based system was claimed to enhance this activity. Therefore, triclosan was incorporated in a combination formula with several active ingredients for the suppression of oral malodour[27].

ZINC SALTS:

Zinc salts have been widely used in the control of oral malodour as they are non-toxic and do not stain teeth compared with other metal salts. These metal salts suppress the production of volatile sulphur compounds in the following order: HgCl2 = CuCl2 = CdCl2 > ZnCl2 > SnF2 > SnCl2 > PbCl2[28]. ZnCl2 is mainly used in mouth rinses as an effective oral deodorant[29] and in dentifrices[30], and its activity is concentration dependent. However, its unpleasant taste alters the incorporated concentration and 0.1% has been found to be acceptable. Despite its unpleasant taste, masking by other ingredients can overcome this problem in order to sustain its efficacy[31]. In addition to zinc chloride, zinc lactate was also used to treat offensive breath with higher efficiency than chlorhexidine (0.20%) and at a lower concentration (0.14%)[32]. Zinc acetate[33] zinc citrate and zinc nitrate were also used[34].

Zinc salts have been used alone and in combination with other ingredients such as, chlorhexidine and cetylpyridinium chloride with a significant reduction in vomit odour producing anaerobes and in combination with NaHCO3 in toothpaste and with NaClO2 generating ClO2 in mouth rinses and dentifrices. The use of zinc for breath odour neutralization is not limited to mouth rinses and dentifrices but has also been included in a chewing gum.In addition to the above ingredients, activated carbon is used as an oral malodour absorbent in several preparations[35] as well as tropolone compounds[36] . Furthermore, there are currently several new preparations containing enzymes claimed to freshen breath. An oral biofilm from a protease enzyme, papain and hydroxyalkyl cellulose was developed as well as a dentifrice containing papain, a lipase enzyme (glycoamylase) and triclosan[37]. In addition, stannous salts have also been used as active ingredients with minimal side effects such as tooth staining and astringency as well as alkali metal chlorides.

CONCLUSION:

Different types of antibiotic mouth rinses are available for oral health care.Active ingredients in oral care preparations play an important role in neutralizing or suppressing vomit odour and mainly rely on their antimicrobial efficacy towards oral cavity microbes. However, some of these compounds, such as essential oils , contribute to flavouring the preparations and are more beneficial than other ingredients as they do not have staining effect on teeth and are believed to be safer than synthetic agents.

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